WHAT IS CLAIMED IS:

1. A method of solid phase synthesis, the method comprising:

providing an azlactone-functionalized support;

reacting the azlactone-functionalized support with a linker molecule to form a linker-functionalized support having a linker attached to the azlactone-functionalized support; and

reacting the linker-functionalized support with an organic molecule to form a covalent bond between the linker and the organic molecule; and

conducting one or more reactions on the covalently bound organic molecule to produce a derivatized organic molecule.

2. The method of claim 1 wherein the covalent bond formed between the linker and the organic molecule can be cleaved under mild conditions.

3. The method of claim 2 wherein mild conditions comprise mild acidic or mild basic conditions.

4. The method of claim 1 further comprising cleaving the derivatized molecule from the linker-functionalized support.

5. The method of claim 1 wherein the organic molecule is a building block for a combinatorial library.

6. The method of claim 1 wherein the derivatized organic molecule is a polypeptide or polynucleotide.

7. The method of claim 1 wherein the linker-functionalized support has the following formula:

$SS–[C(O)\text{-}NH\text{-}C(R^5)(R^6)\text{-}(CH_2)_n\text{-}C(O)\text{-}NH\text{-}(C(R^1)(R^2))_p\text{-}C(R^3)(R^4)(OR^7)]_m$

wherein:

SS represents a support material;

$C(O)$-NH-$C(R^5)(R^6)$-$(CH_2)_n$-$C(O)$ is derived from an azlactone group, wherein R^5 and R^6 are each independently an organic group and n is 0 to 1;

NH-$(C(R^1)(R^2))_p$-$C(R^3)(R^4)(OR^7)$ represents the linker, wherein R^1, R^2, R^3, and R^4 are each independently hydrogen or an organic group with the proviso that at least one of R^3 and R^4 is an aromatic group, R^7 is hydrogen, a protecting group, or an organic group capable of being derivatized, and p is at least 1; and

m is 1 to the resin capacity of the support material;

and further wherein reacting the linker-functionalized support with an organic molecule occurs at the -OR^7 group.

8. The method of claim 7 wherein p is 1 to 20.

9. The method of claim 7 wherein R^7 is hydrogen.

10. The method of claim 7 wherein R^7 is a protecting group and conducting one or more reactions on the linker attached to the azlactone-functionalized support comprises removing the protecting group.

11. The method of claim 1 wherein the azlactone-functionalized support is in the form of a plurality of particles or a membrane.

12. The method of claim 1 wherein the linker-functionalized support has the following formula:

SS–[$C(O)$-NH-$C(R^5)(R^6)$-$(CH_2)_n$-$C(O)$-NH-(R^8)-NH-$C(O)$-R^9]$_m$

wherein:

SS represents a support material;

$C(O)$-NH-$C(R^5)(R^6)$-$(CH_2)_n$-$C(O)$ is derived from an azlactone group, wherein R^5 and R^6 are each independently an organic group and n is 0 to 1;

NH-(R^8)-NH is derived from a diamine, wherein R^8 is an organic connecting group;

$C(O)$-R^9 represents the linker, wherein R^9 is an organic group; and

m is 1 to the resin capacity of the support material;

and further wherein reacting the linker-functionalized support with an organic molecule occurs at the $-R^9$ group.

13. A method of solid phase synthesis, the method comprising:

providing an amine-modified-azlactone-functionalized support;

reacting the amine-modified-azlactone-functionalized support with a linker molecule to form a linker-functionalized support having a linker attached to the amine-modified-azlactone-functionalized support; and

conducting one or more reactions on the linker-functionalized support.

14. The method of claim 13 wherein conducting one or more reactions on the linker-functionalized support comprises:

reacting the linker-functionalized support with an organic molecule to form a covalent bond between the linker and the organic molecule; and

conducting one or more reactions on the covalently bound organic molecule to produce a derivatized organic molecule.

15. The method of claim 14 wherein the covalent bond formed between the linker and the organic molecule can be cleaved under mild conditions.

16. The method of claim 15 wherein mild conditions comprise mild acidic or mild basic conditions.

17. The method of claim 14 further comprising cleaving the derivatized molecule from the linker-functionalized support.

18. A method of solid phase synthesis, the method comprising:

providing a linker-functionalized support having the formula:

$$SS–[NH-(C(R^1)(R^2))_p-C(R^3)(R^4)(OR^7)]_m$$

wherein:

SS represents a support material;

$NH\text{-}(C(R^1)(R^2))_p\text{-}C(R^3)(R^4)(OR^7)$ represents a linker, wherein R^1, R^2, R^3, and R^4 are each independently hydrogen or an organic group with the proviso that at least one of R^3 and R^4 is an aromatic group, R^7 is hydrogen, a protecting group, or an organic group capable of being derivatized, and p is at least 1; and

m is 1 to the resin capacity of the support material; and

conducting one or more reactions on the linker-functionalized support.

19. The method of claim 18 wherein conducting one or more reactions on the linker-functionalized support comprises:

reacting the linker-functionalized support with an organic molecule to form a covalent bond between the linker and the organic molecule; and

conducting one or more reactions on the covalently bound organic molecule to produce a derivatized organic molecule.

20. The method of claim 19 wherein the covalent bond between the linker and the organic molecule can be cleaved under mild conditions.

21. The method of claim 19 further comprising cleaving the derivatized molecule from the linker-functionalized support.

22. The method of claim 18 wherein R^7 is hydrogen.

23. The method of claim 18 wherein R^7 is a protecting group and conducting one or more reactions on the linker attached to the azlactone-functionalized support comprises removing the protecting group.

Ant. Basis

24. The method of claim 18 wherein the linker is bound to the support material through a carbonyl group.

25. A method of solid phase synthesis, the method comprising:

providing an azlactone-functionalized support having a linker attached thereto, which has the formula:

$SS–[C(O)-NH-C(R^5)(R^6)-(CH_2)_n-C(O)-NH-(C(R^1)(R^2))_p-C(R^3)(R^4)(OR^7)]_m$

wherein:

SS represents a support material;

$C(O)-NH-C(R^5)(R^6)-(CH_2)_n-C(O)$ is derived from an azlactone group, wherein R^5 and R^6 are each independently an organic group and n is 0 to 1;

$NH-(C(R^1)(R^2))_p-C(R^3)(R^4)(OR^7)$ represents the linker, wherein R^1, R^2, R^3, and R^4 are each independently hydrogen or an organic group with the proviso that at least one of R^3 and R^4 is an aromatic group, R^7 is hydrogen, a protecting group, or an organic group capable of being derivatized, and p is at least 1; and

m is 1 to the resin capacity of the support material; and

conducting one or more reactions on the linker-functionalized support.

26. A method of solid phase synthesis, the method comprising:

providing an azlactone-functionalized support having a linker attached thereto, which has the formula:

$SS–[C(O)-NH-C(R^5)(R^6)-(CH_2)_n-C(O)-NH-(R^8)-NH-C(O)-R^9]_m$

wherein:

SS represents a support material;

$C(O)-NH-C(R^5)(R^6)-(CH_2)_n-C(O)$ is derived from an azlactone group, wherein R^5 and R^6 are each independently an organic group and n is 0 to 1;

$NH-(R^8)-NH$ is derived from a diamine, wherein R^8 is an organic connecting group;

$C(O)-R^9$ represents the linker, wherein R^9 is an organic group; and

m is 1 to the resin capacity of the support material; and

conducting one or more reactions on the linker-functionalized support.

27 A method of solid phase synthesis, the method comprising:

providing an azlactone-functionalized support having a linker attached thereto, which has the formula:

$SS–[C(O)-NH-C(R^5)(R^6)-(CH_2)_n-C(O)-NH-(C(R^1)(R^2))_p-C(R^3)(R^4)(OR^7)]_m$

wherein:

SS represents a support material;

$C(O)$-NH-$C(R^5)(R^6)$-$(CH_2)_n$-$C(O)$ is derived from an azlactone group, wherein R^5 and R^6 are each independently an organic group and n is 0 to 1;

NH-$(C(R^1)(R^2))_p$-$C(R^3)(R^4)(OR^7)$ represents the linker, wherein R^1, R^2, R^3, and R^4 are each independently hydrogen or an organic group with the proviso that at least one of R^3 and R^4 is an aromatic group, R^7 is hydrogen, a protecting group, or an organic group capable of being derivatized, and p is at least 1; and

m is 1 to the resin capacity of the support material;

reacting the linker with an organic molecule to form a covalent bond between the linker and the organic molecule;

conducting one or more reactions on the covalently bound organic molecule to produce a derivatized organic molecule; and

cleaving the derivatized molecule from the azlactone-functionalized support having a linker attached thereto.

28. A method of solid phase synthesis, the method comprising:

providing a linker-functionalized support having the formula:

SS–[C(O)-NH-$C(R^5)(R^6)$-$(CH_2)_n$-C(O)-NH-(R^8)-NHC(O)-R^9]$_m$

wherein:

SS represents a support material;

$C(O)$-NH-$C(R^5)(R^6)$-$(CH_2)_n$-$C(O)$ is derived from an azlactone group, wherein R^5 and R^6 are each independently an organic group and n is 0 to 1;

NH-(R^8)-NH is derived from a diamine, wherein R^8 is an organic connecting group;

$C(O)$-R^9 represents the linker, wherein R^9 is an organic group; and

m is 1 to the resin capacity of the support material;

reacting the linker with an organic molecule so as to form a covalent bond between the linker and the organic molecule;

conducting one or more reactions on the covalently bound organic molecule to produce a derivatized organic molecule; and

cleaving the derivatized molecule from the azlactone-functionalized support having a linker attached thereto.

29. The method of claim 28 wherein $C(O)-R^9$ is derived from 4-hydroxymethylbenzoic acid, 4-hydroxymethylphenoxyacetic acid, 4-hydroxymethyl-3-methoxyphenoxybutyric acid, 4-hydroxymethylphenylacetic acid, 4-bromoacetylphenoxyacetic acid, 4-(diphenylhydroxymethyl)benzoic acid, 4-hydroxymethyl-2-methoxy-5-nitrophenoxybutyric acid, phenoxyacetic acid and phenoxybutyric acid analogs of Rink acid and Rink amide linker molecules and Sieber amide linker molecules, 4-sulfamylbenzoic acid, 4-sulfamylbutyric acid, 4-formylphenoxyacetic acid, 4-(4-formyl-3-methoxyphenoxy)butyric acid, 4-formyl-3,5-dimethoxyphenoxyacetic acid, or 3-formylindol-1-ylacetic acid.

30. The method of claim 28 wherein $NH-(R^8)-NH$ is derived from ethylenediamine, 1,3-propanediamine, 1,3-diamino-2-hydroxypropane, or 1,6-hexanediamine.

31. A functionalized support material having the formula:

$$SS–[NH-(C(R^1)(R^2))_p-C(R^3)(R^4)(OR^7)]_m$$

wherein:

SS represents a support material;

R^1, R^2, R^3, and R^4 are each independently hydrogen or an organic group with the proviso that at least one of R^3 and R^4 is an aromatic group;

R^7 is hydrogen or an organic group;

p is at least 1; and

m is 1 to the resin capacity of the support material.

32. The functionalized support of claim 31 wherein R^7 is hydrogen, a protecting group, or an organic group capable of being derivatized.

33. The functionalized support of claim 31 which is in the form of a plurality of particles.

34. The functionalized support of claim 33 wherein each R^7 is the same on any one particle.

35. The functionalized support of claim 33 wherein the plurality of particles comprise at least two different R^7 groups.

36. The functionalized support of claim 35 which forms a combinatorial library.

37. The functionalized support of claim 31 which is in the form of a membrane.

38. The functionalized support of claim 37 wherein each R^7 is the same on the membrane.

39. The functionalized support of claim 37 wherein the membrane comprises at least two different R^7 groups.

40. The functionalized support of claim 39 which forms a combinatorial library.

41. The functionalized support of claim 31 wherein $NH\text{-}(C(R^1)(R^2))_p\text{-}C(R^3)(R^4)(OR^7)$ is bound to the support material through a carbonyl group.

42. A functionalized support having the following formula:

$SS\text{–}[C(O)\text{-}NH\text{-}C(R^5)(R^6)\text{-}(CH_2)_n\text{-}C(O)\text{-}NH\text{-}(C(R^1)(R^2))_p\text{-}C(R^3)(R^4)(OR^7)]_m$

wherein:

SS represents a support material;

R^1, R^2, R^3, and R^4 are each independently hydrogen or an organic group with the proviso that at least one of R^3 and R^4 is an aromatic group;

R^7 is hydrogen or an organic group;

R^5 and R^6 are each independently an organic group;

n is 0 to 1;

p is at least 1; and

m is 1 to the resin capacity of the support material.

43. The functionalized support of claim 42 wherein p is 1 to 20.

44. The functionalized support of claim 42 wherein R^7 is hydrogen, a protecting group, or an organic group capable of being derivatized.

45. The functionalized support of claim 42 which is in the form of a plurality of particles.

46. The functionalized support of claim 45 wherein each R^7 is the same on any one particle.

47. The functionalized support of claim 45 wherein the plurality of particles comprise at least two different R^7 groups.

48. The functionalized support of claim 47 which forms a combinatorial library.

49. The functionalized support of claim 42 which is in the form of a membrane.

50. The functionalized support of claim 49 wherein each R^7 is the same on the membrane.

51. The functionalized support of claim 49 wherein the membrane comprises at least two different R^7 groups.

52. The functionalized support of claim 51 which forms a combinatorial library.

53. A functionalized support having the following formula:

$$SS–[C(O)\text{-}NH\text{-}C(R^5)(R^6)\text{-}(CH_2)_n\text{-}C(O)\text{-}NH\text{-}(R^8)\text{-}NH\text{-}C(O)\text{-}R^9]_m$$

wherein:

SS represents a support material;

R^5, R^6, and R^9 are each independently an organic group;

R^8 is an organic connecting group;

n is 0 to 1; and

m is 1 to the resin capacity of the support material.

54. The functionalized support of claim 53 wherein C(O)-R^9 is derived from 4-hydroxymethylbenzoic acid, 4-hydroxymethylphenoxyacetic acid, 4-hydroxymethyl-3-methoxyphenoxybutyric acid, 4-hydroxymethylphenylacetic acid, 4-bromoacetylphenoxyacetic acid, 4-(diphenylhydroxymethyl)benzoic acid, 4-hydroxymethyl-2-methoxy-5-nitrophenoxybutyric acid, phenoxyacetic acid and phenoxybutyric acid analogs of Rink acid and Rink amide linker molecules and Sieber amide linker molecules, 4-sulfamylbenzoic acid, 4-sulfamylbutyric acid, 4-formylphenoxyacetic acid, 4-(4-formyl-3-methoxyphenoxy)butyric acid, 4-formyl-3,5-dimethoxyphenoxyacetic acid, or 3-formylindol-1-ylacetic acid.

55. The functionalized support of claim 53 wherein NH-(R^8)-NH is derived from ethylenediamine, 1,3-propanediamine, 1,3-diamino-2-hydroxypropane, or 1,6-hexanediamine.

56. The functionalized support of claim 53 which is in the form of a plurality of particles.

57. The functionalized support of claim 56 wherein each R^9 is the same on any one particle.

58. The functionalized support of claim 56 wherein the plurality of particles comprise at least two different R^9 groups.

59. The functionalized support of claim 56 which forms a combinatorial library.

60. The functionalized support of claim 53 which is in the form of a membrane.

61. The functionalized support of claim 60 wherein each R^9 is the same on the membrane.

62. The functionalized support of claim 60 wherein the membrane comprises at least two different R^9 groups.

63. The functionalized support of claim 62 which forms a combinatorial library.

64. A functionalized support material having the formula:

$$SS–[NH\text{-}(C(R^1)(R^2))_p\text{-}C(R^3)(R^4)(OR^7)]_m$$

wherein:

SS represents a support material;

R^1, R^2, R^3, and R^4 are each independently hydrogen, a (C1-C14)alkyl group, a (C3-C14)cycloalkyl group, or a (C5-C12)aryl group, with the proviso that at least one of R^3 and R^4 is a (C5-C12)aryl group;

R^7 is hydrogen or an organic group;

p is 1 to 20; and

m is 1 to the resin capacity of the support material.

65. A functionalized support having the following formula:

$$SS–[C(O)\text{-}NH\text{-}C(R^5)(R^6)\text{-}(CH_2)_n\text{-}C(O)\text{-}NH\text{-}(C(R^1)(R^2))_p\text{-}C(R^3)(R^4)(OR^7)]_m$$

wherein:

SS represents a support material;

R^1, R^2, R^3, and R^4 are each independently hydrogen, a (C1-C14)alkyl group, a (C3-C14)cycloalkyl group, or a (C5-C12)aryl group, with the proviso that at least one of R^3 and R^4 is a (C5-C12)aryl group;

R^7 is hydrogen or an organic group;

R^5 and R^6 are each independently a (C1-C14)alkyl group, a (C3-C14)cycloalkyl group, or a (C5-C12)aryl group;

n is 0 to 1;

p is 1 to 20; and

m is 1 to the resin capacity of the support material.

66. A functionalized support having the following formula:

$SS–[C(O)\text{-}NH\text{-}C(R^5)(R^6)\text{-}(CH_2)_n\text{-}C(O)\text{-}NH\text{-}(R^8)\text{-}NH\text{-}C(O)\text{-}R^9]_m$

wherein:

SS represents a support material;

R^5 and R^6 are each independently a (C1-C14)alkyl group, a (C3-C14)cycloalkyl group, or a (C5-C12)aryl group;

R^9 is an organic group;

R^8 is a (C1-C1000)alkylene group;

n is 0 to 1; and

m is 1 to the resin capacity of the support material.